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# Putting New Populations on the Map: Eastern Pacific Hawksbills

Alexander R. Gaos

Conservation Scientist, Marine Mammal & Turtle Research Division

NOAA Fisheries, Southwest Fisheries Science Center

Review of NOAA Fisheries' Science on Marine Mammals & Turtles

Southwest and Northwest Fisheries Science Centers

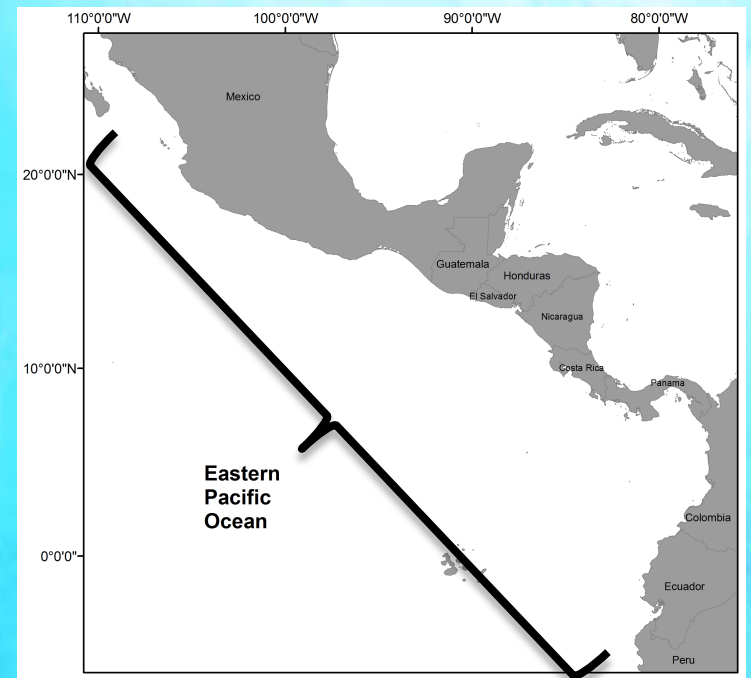
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La Jolla, CA

# Introduction

## Hawksbills turtles in the eastern Pacific Ocean:

- Considered virtually absent in 2007 (Cornelius 1982; Mortimer & Donnelly 2008)
- Important rookeries discovered (Gaos et al. 2010, 2012a; Liles et al. 2011, 2015)
- Among world's most endangered populations (Wallace et al. 2011)
- Historically more abundant (Cornelius 1982; Seminoff et al. 2003; Gaos et al. 2010)

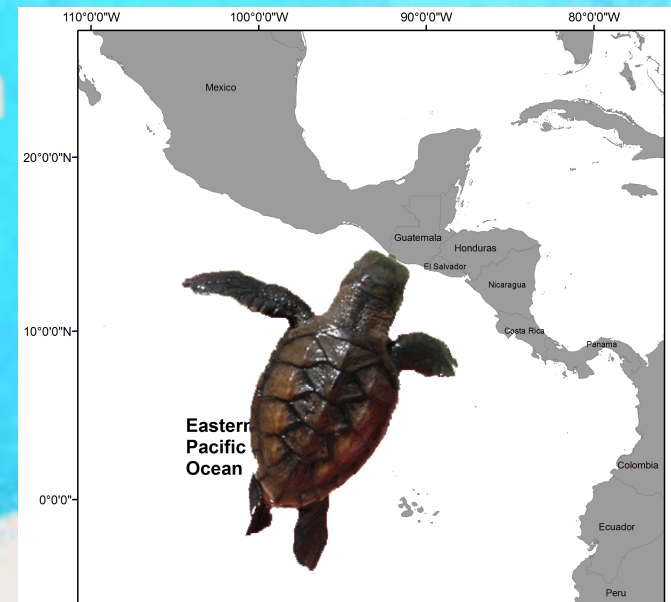


# Eastern Pacific Hawksbill Initiative (ICAPO)

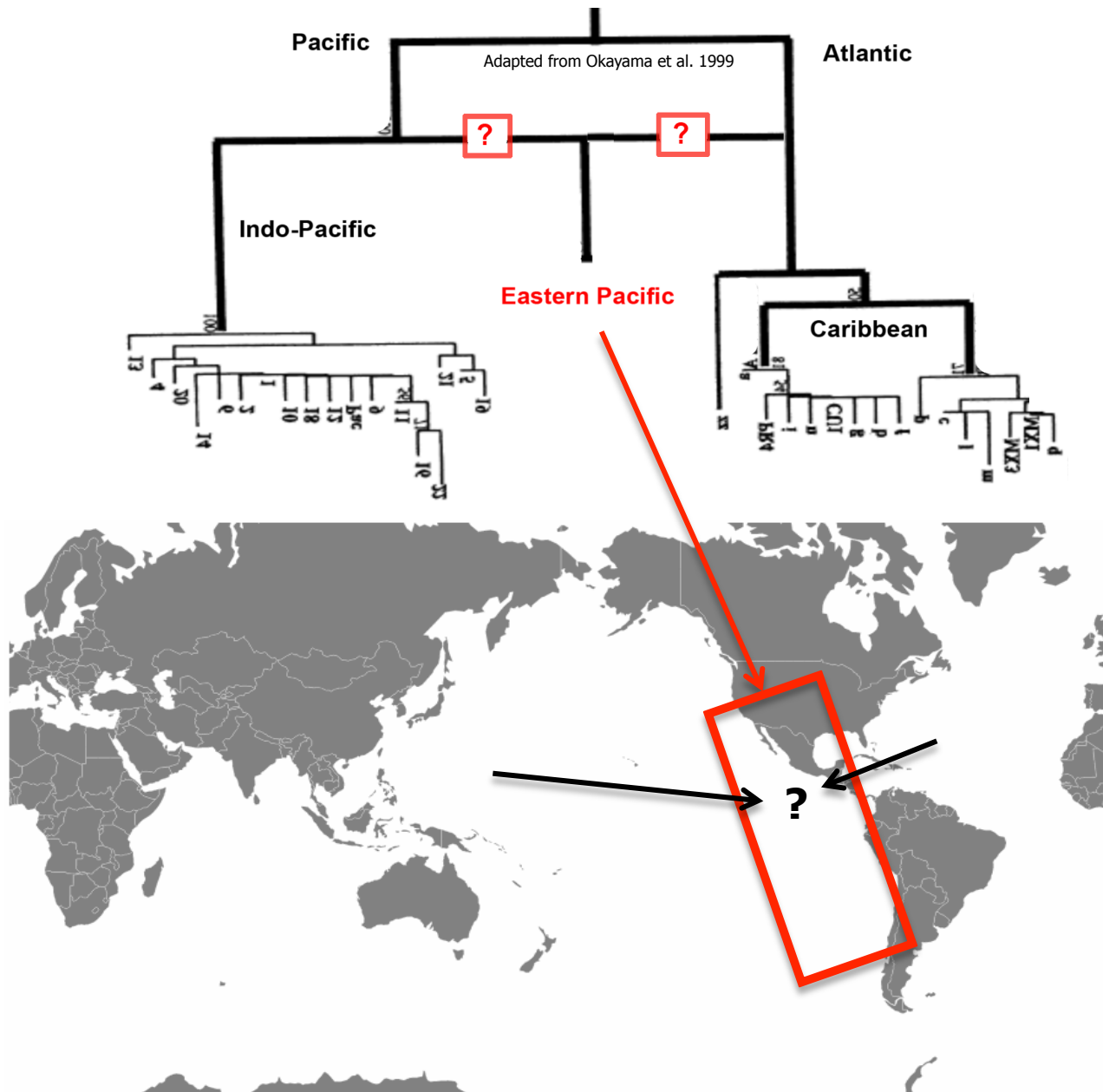


# Hawksbills turtles in the eastern Pacific Ocean:

- Conservation projects established
- Unique life history characteristics (Gaos et al. 2012)
- Referred to as a single population
  - Paucity of information



# Gap in global phylogeny of hawksbills



# Research Questions

- 1) Overall genetic diversity
- 2) Stock structure and connectivity
- 3) Evolutionary history
- 4) Scales of management

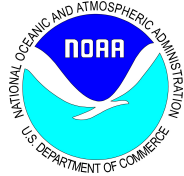


# Methods

Tissue collection from  
nesting sites  
2008-2014  
 $n = 269$

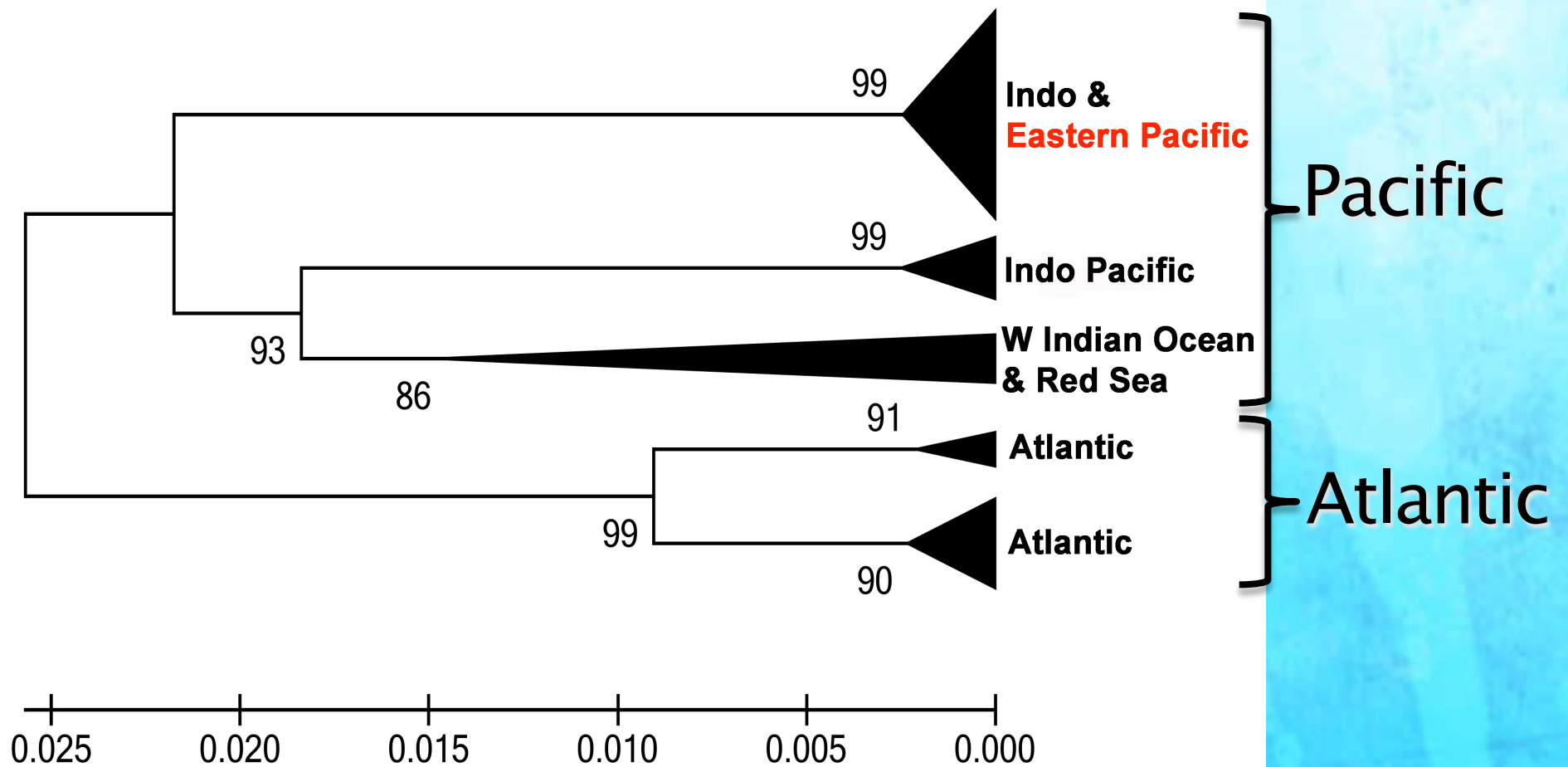


# Laboratory procedures & analyses



- Sequenced 800+ bp mtDNA segment (control region)
- Standard 766 bp reading frame
- $F_{ST}$  for population structure (Arlequin v 3.2)
  - Four rookeries with  $n > 10$
- Phylogenetic relationships (Mega v. 6; BEAST)

# Results & Discussion

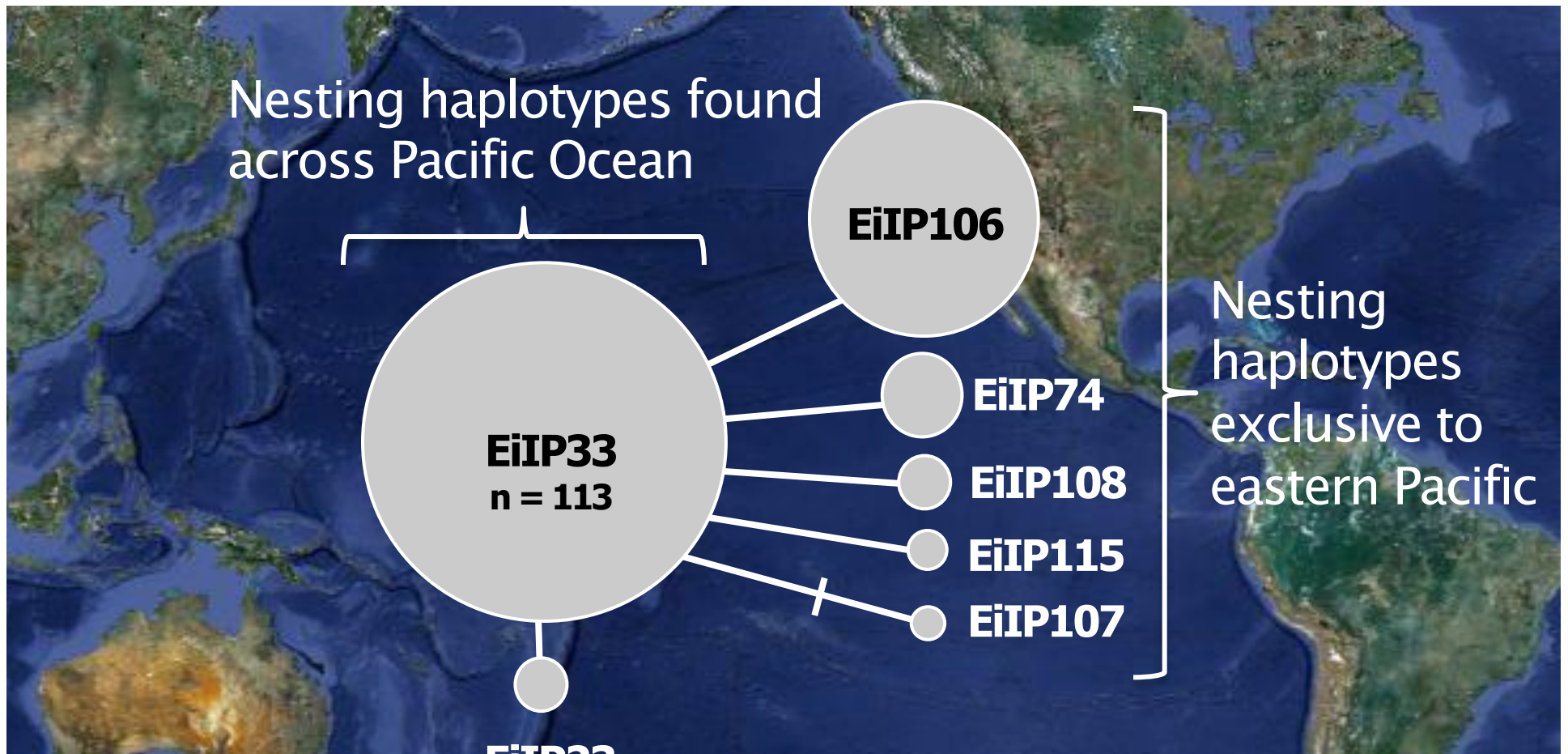


# Genetic diversity

- Seven haplotypes
- 1-2 bp differences
- Shared nesting haplotypes across Pacific

$$h = 0.5778$$

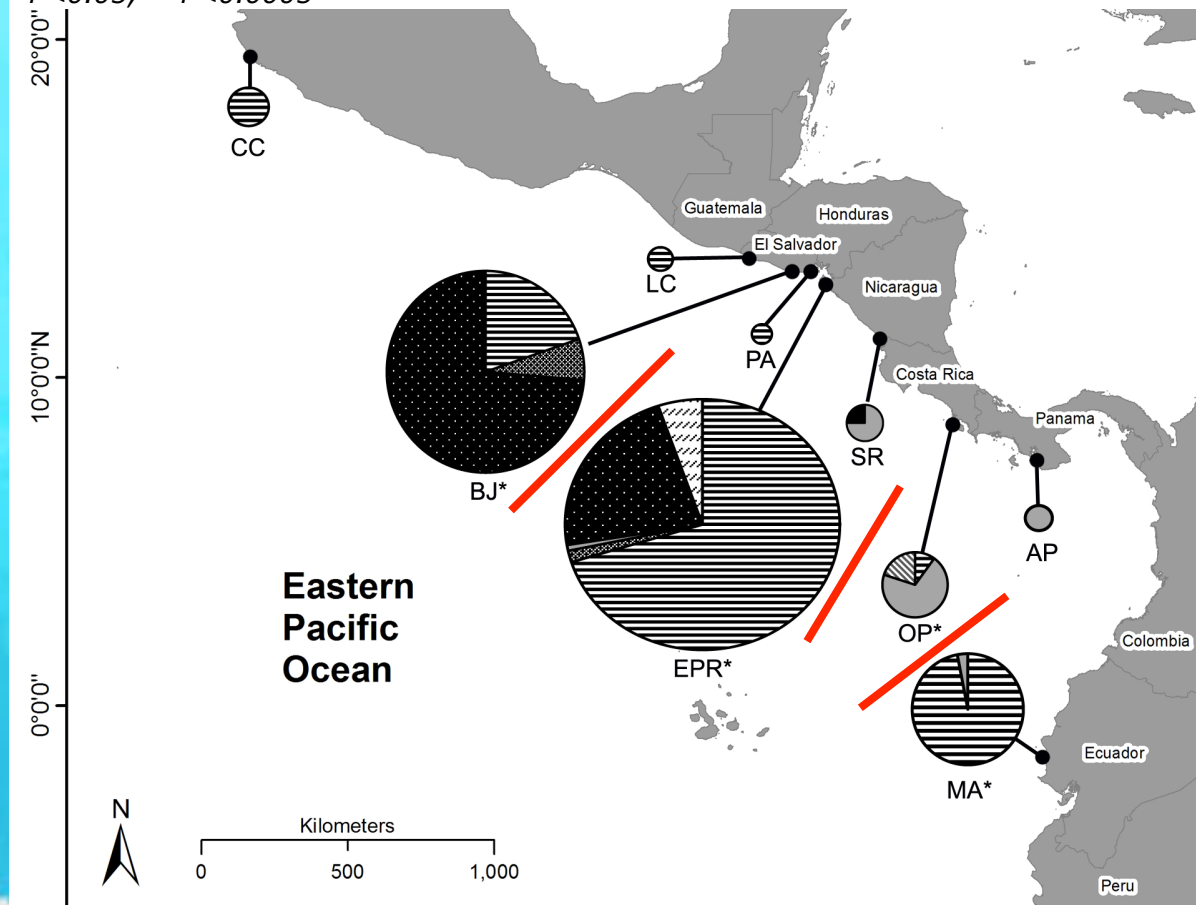
$$\pi = 0.0009$$



# Nesting genetic stock structure

	Bahia Jiquilisco	Estero Padre Ramos	Osa Peninsula	Machalilla
Bahia Jiquilisco	-	115 km	750 km	1,835 km
Estero Padre Ramos	0.3706**	-	645 km	1,745 km
Osa Peninsula	0.5541**	0.4916**	-	1,115 km
Machalilla	0.6433**	0.1257*	0.7791**	-

\* $P < 0.05$ , \*\* $P < 0.0005$



## Haplotype



\* Indicates sites included in genetic stock structure analysis

# Primary mtDNA findings

- Radiated out of western Pacific
- Multiple populations
- Distinct Management Units



# Current & future research

- Ongoing sample collection
- Foraging areas  
 $n = 324$



# Current & future research

- Ongoing sample collection
- Foraging areas  
 $n = 324$
- Nuclear DNA markers
- Multiple paternity and sex ratios



# Recovery

- Stock structure
- Management Units
- Connectivity

Recovery Plan for U.S. Pacific Populations  
*of the*  
**Hawksbill Turtle**  
*(Eretmochelys imbricata)*



U.S. Department of Commerce  
National Oceanic and Atmospheric Administration  
National Marine Fisheries Service



U.S. Department of the Interior  
U.S. Fish and Wildlife Service

# Gracias!

